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Integrated Design Capability / Instrument Design Laboratory

# Ocean Color Experiment Ver. 3 (OCE3)

*~ Final Presentation ~*

## Mechanical Systems

June 18, 2012

*The IDL Team shall not distribute this material without permission  
from Betsy Edwards (Betsy.Edwards@nasa.gov)*



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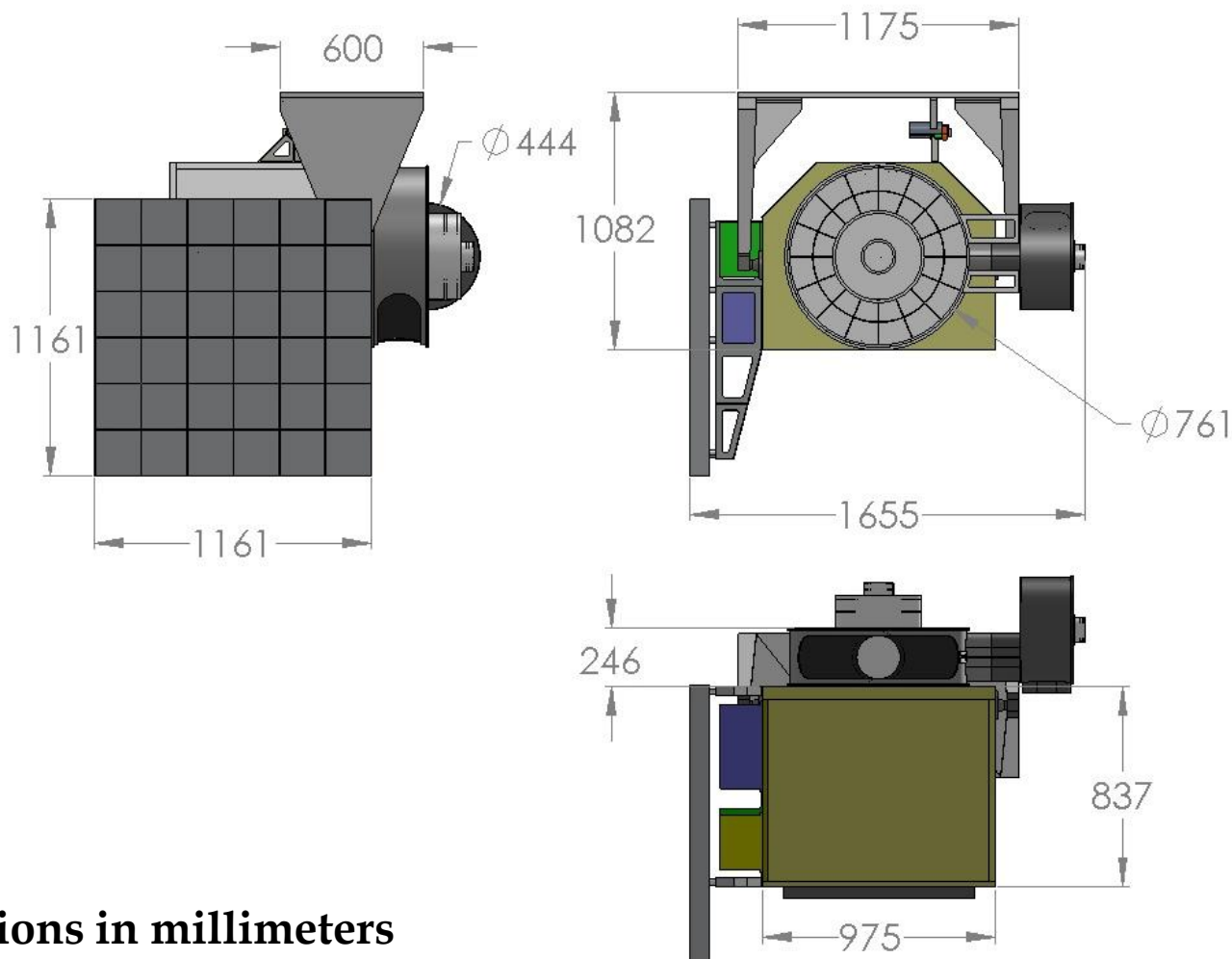
# Mechanical Systems Work

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- **Using the design from OCE2 as a baseline template**
- **Three Main Assemblies**
  - Scan Drum And Assembly Mechanism—Telescope, optics, telescope spinning mechanism, calibrating mechanism
  - Aft Optics/Detector Assembly—Detectors, Aft Optics, Fiber Optics, Aft Structure, Digitizer Box
  - Cradle Assembly—Tilting Mechanism, I/F to Spacecraft, Main Electronics Box, Mechanisms Control Electronics Box
- **Structural materials used**
  - Al 6061-T6
  - Aluminum Honeycomb

# Instrument Envelope

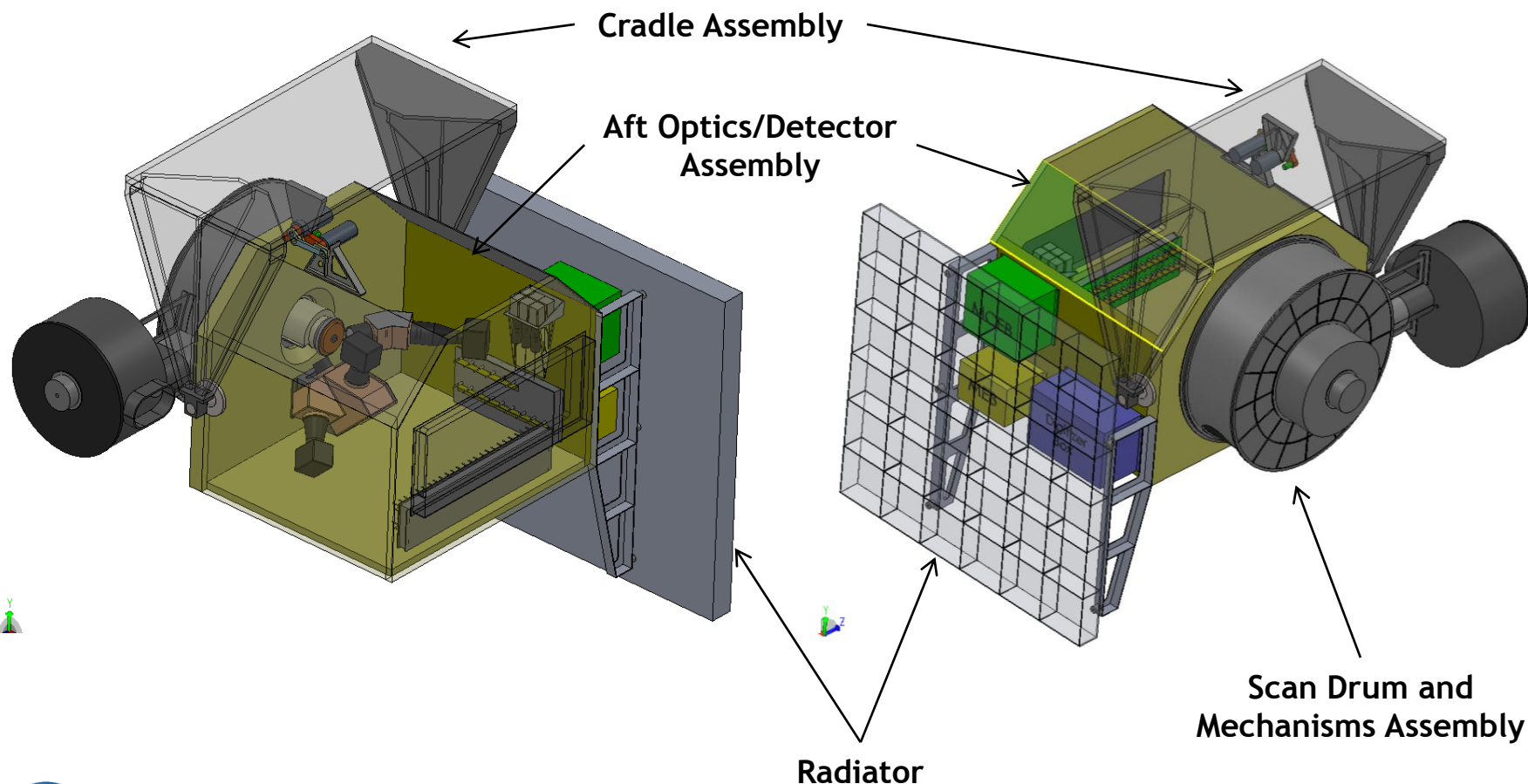
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Dimensions in millimeters

# Instrument Packaging Overview

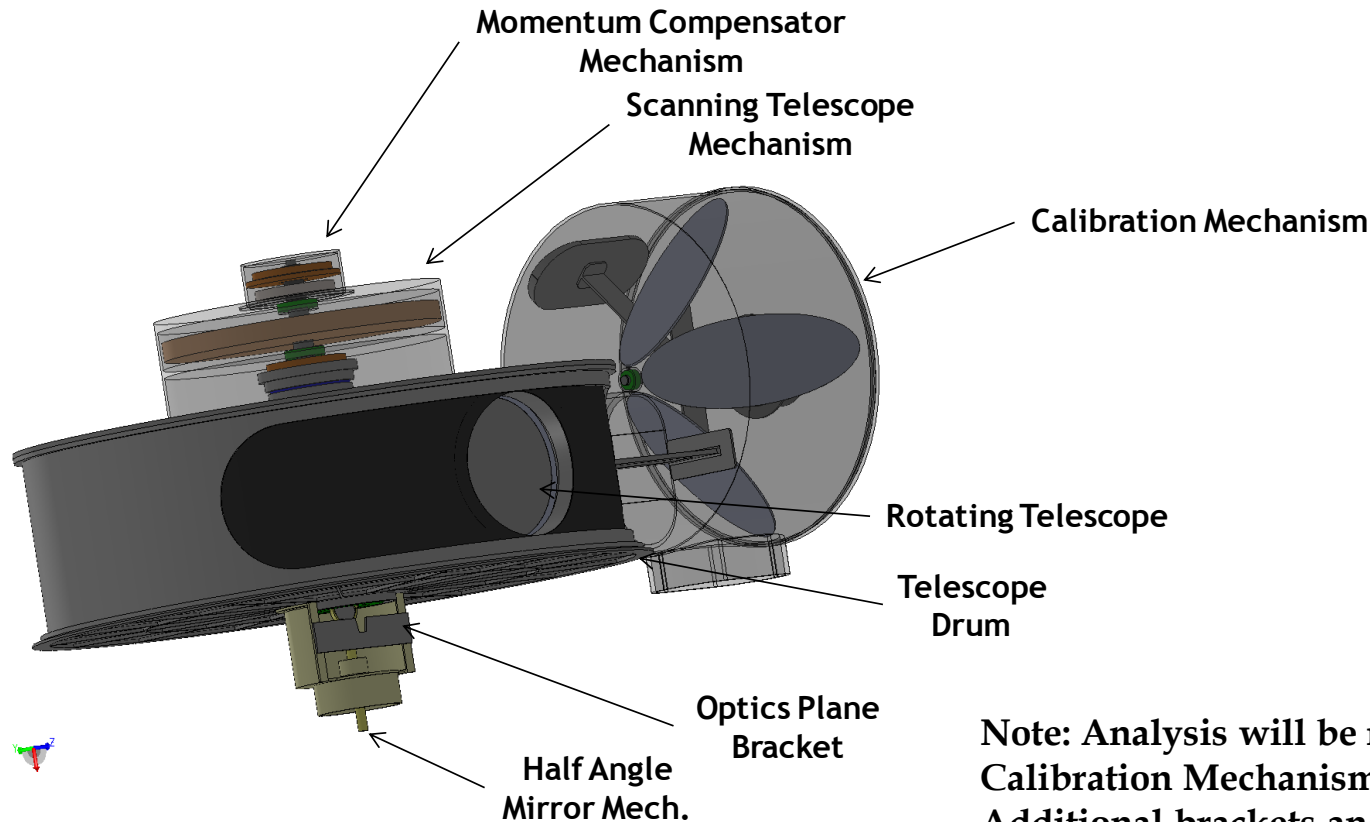
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# Scan Drum and Mechanism Assembly



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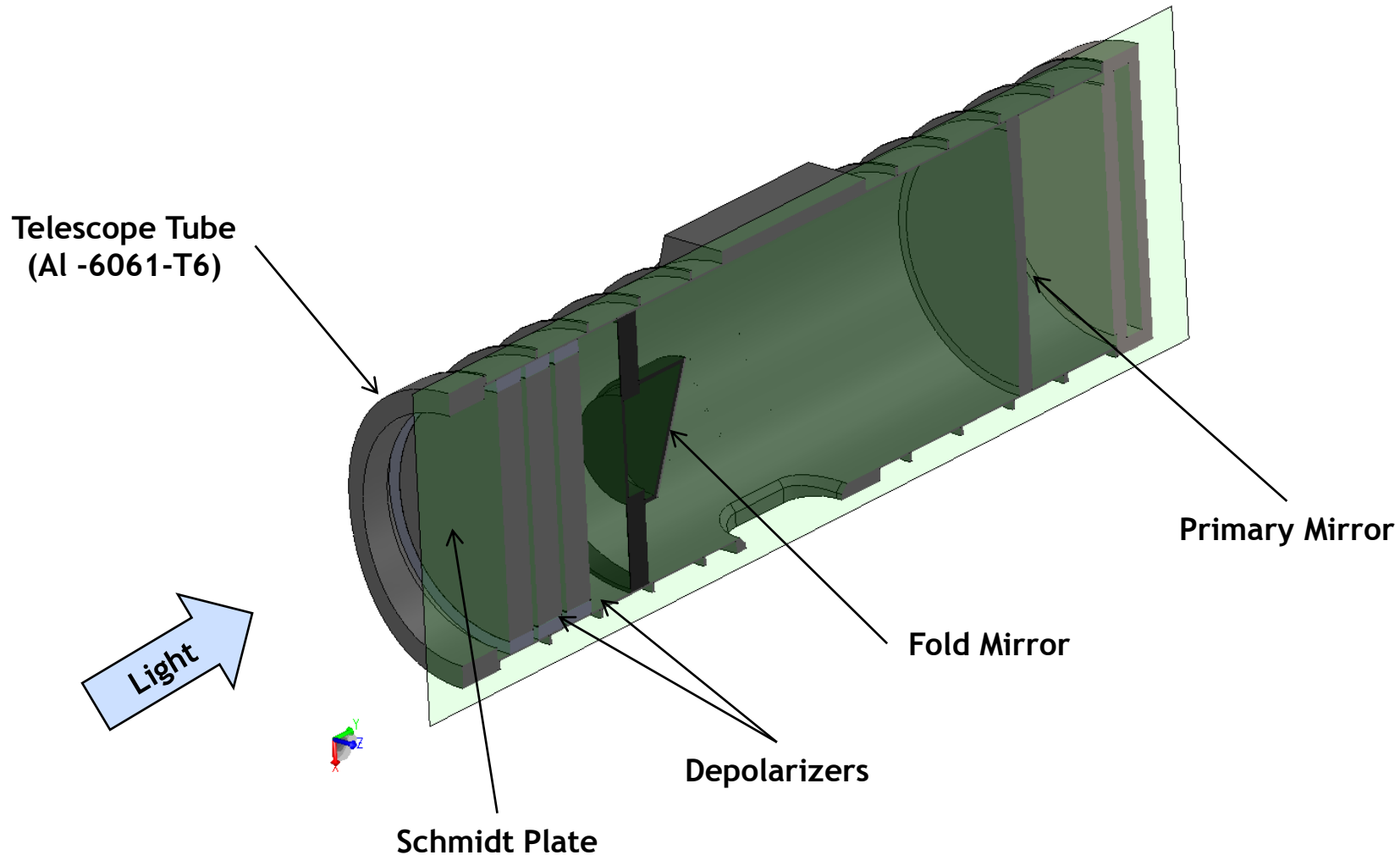


**Note: Analysis will be required to ensure Calibration Mechanism is well supported. Additional brackets and/or design modifications might be needed to increase the stiffness of the joint between the Cal Mechanism and the Scan Drum based on analysis results.**



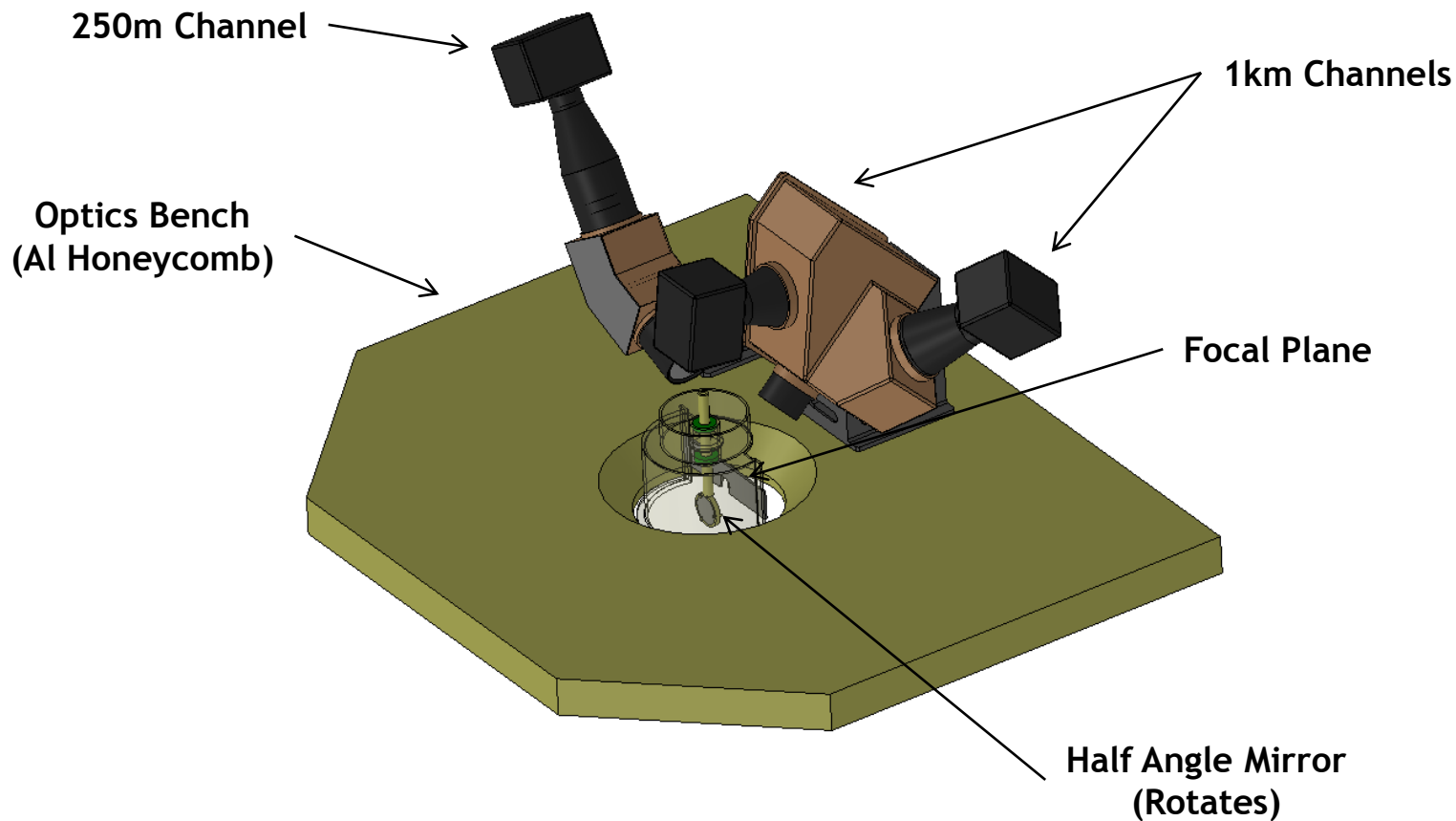
# Scanning Telescope Assembly

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# Aft Optics

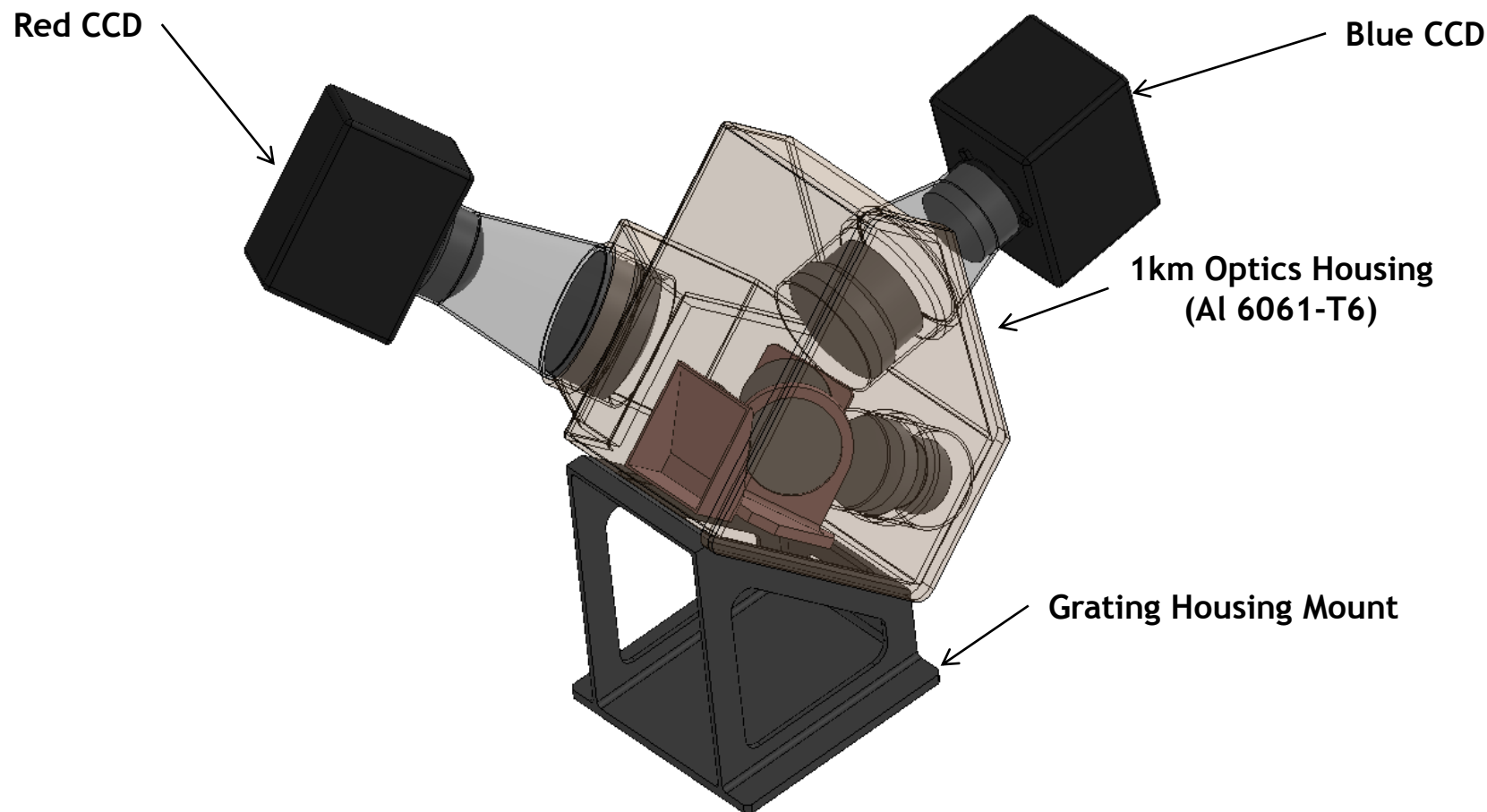
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# 1km Channel Aft Optics

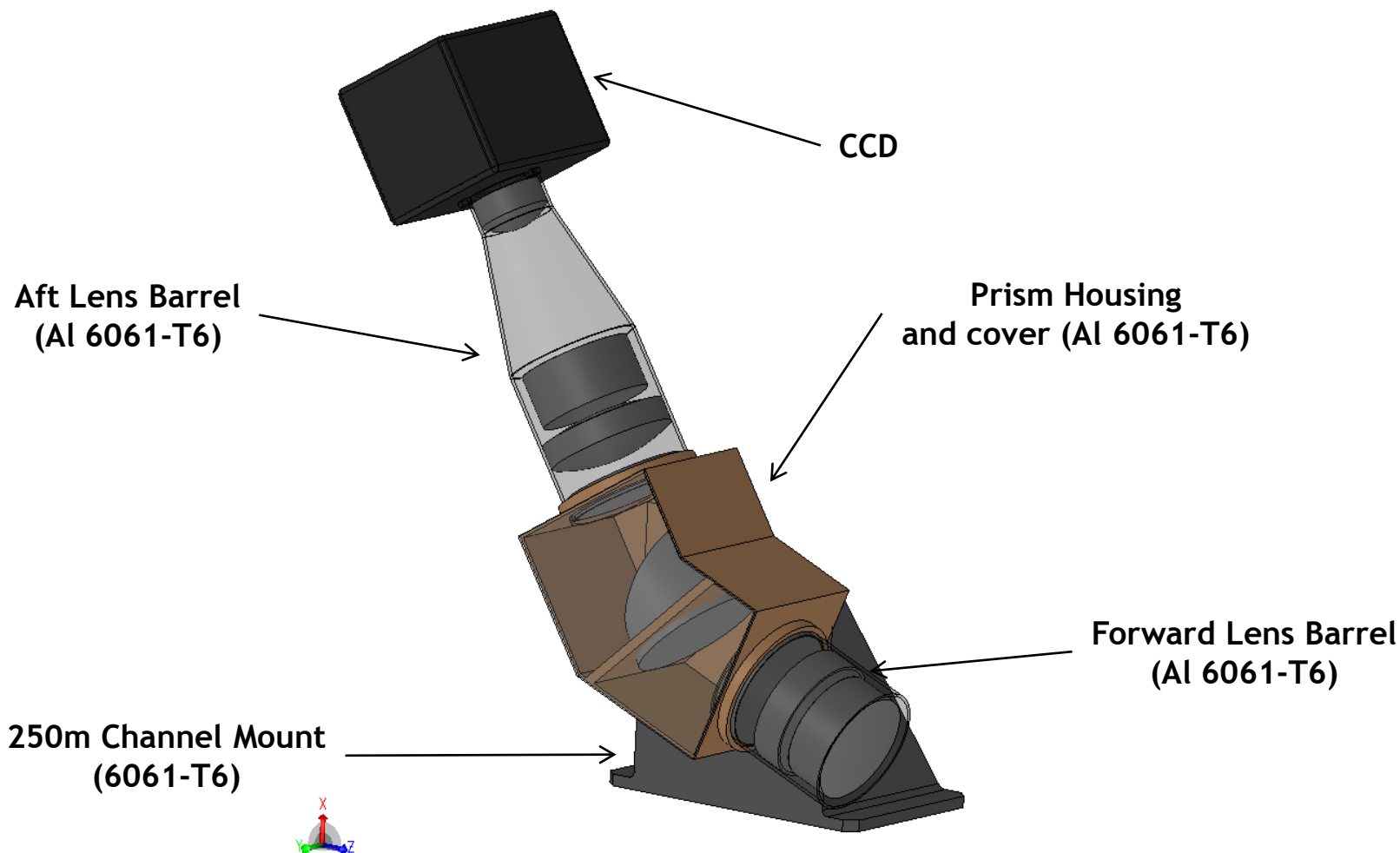
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# 250m Channel Aft Optics

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# Focal Plane—Image Slicer Assembly

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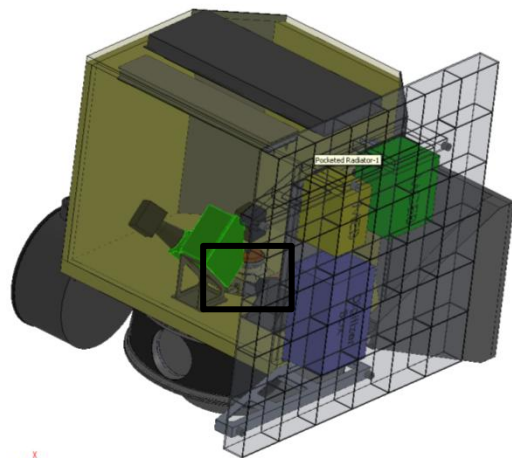
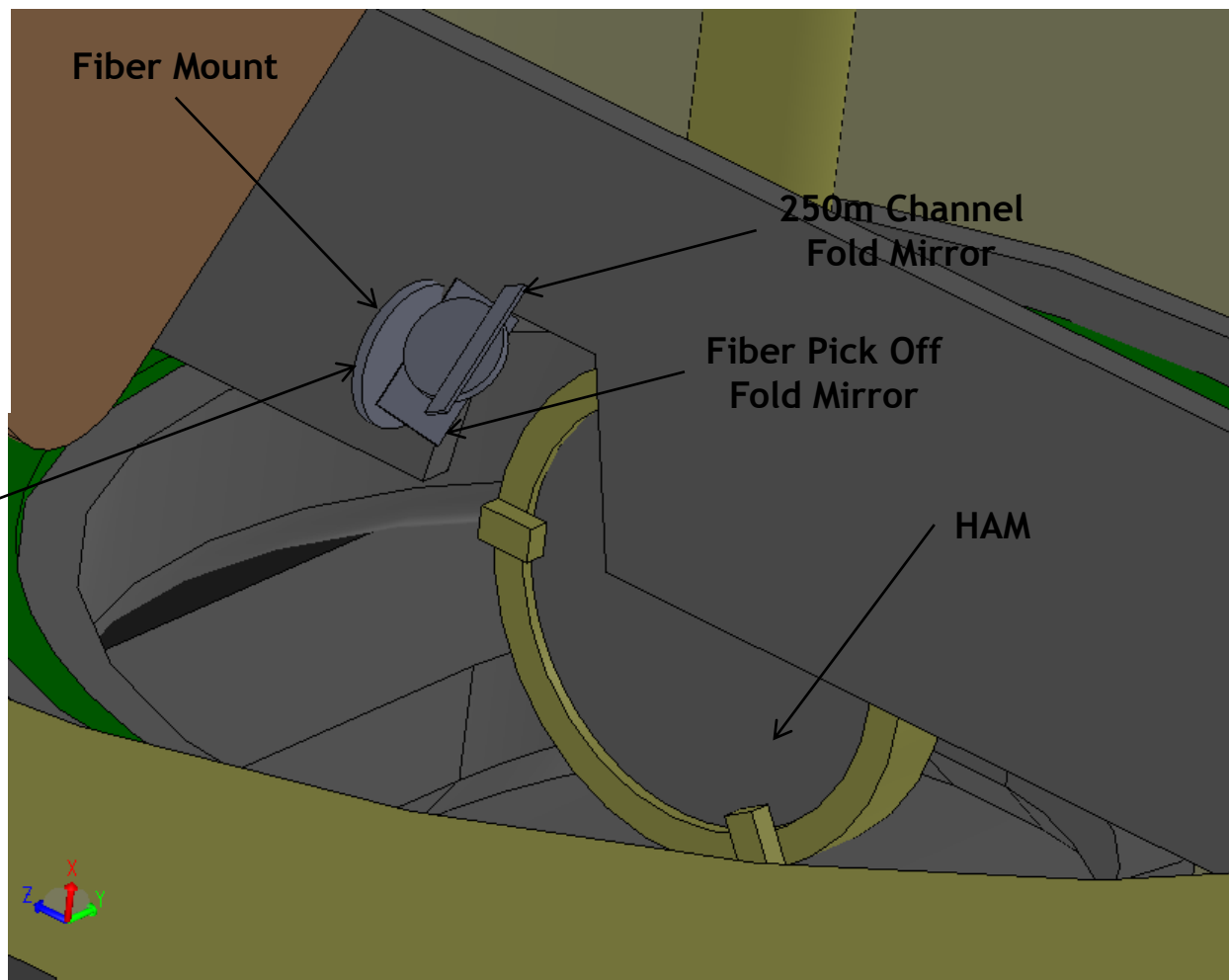


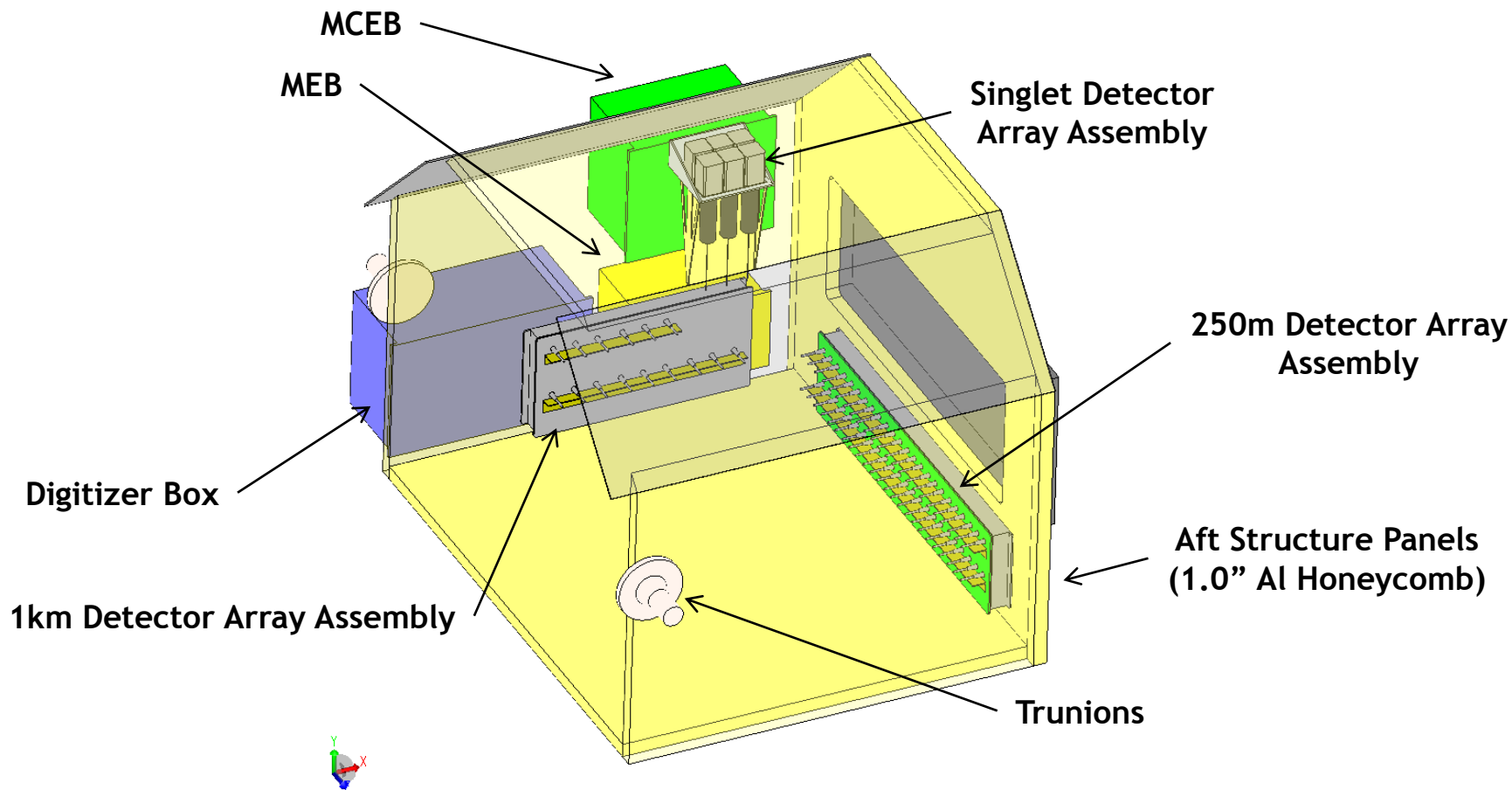
Image Slicer/  
Slit Plate



**Note:** Incorporating all these components in the focal plane will be a design challenge.

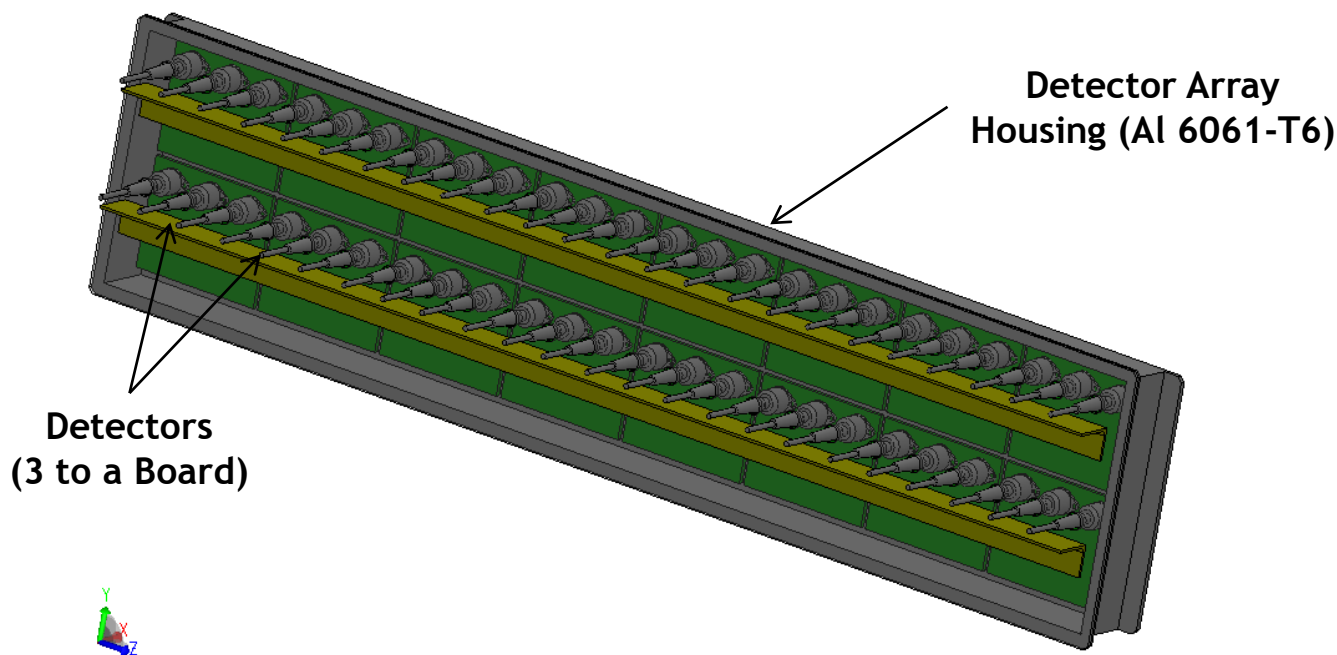
# Aft Optics/Detector Assembly

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# Detector Array Assembly

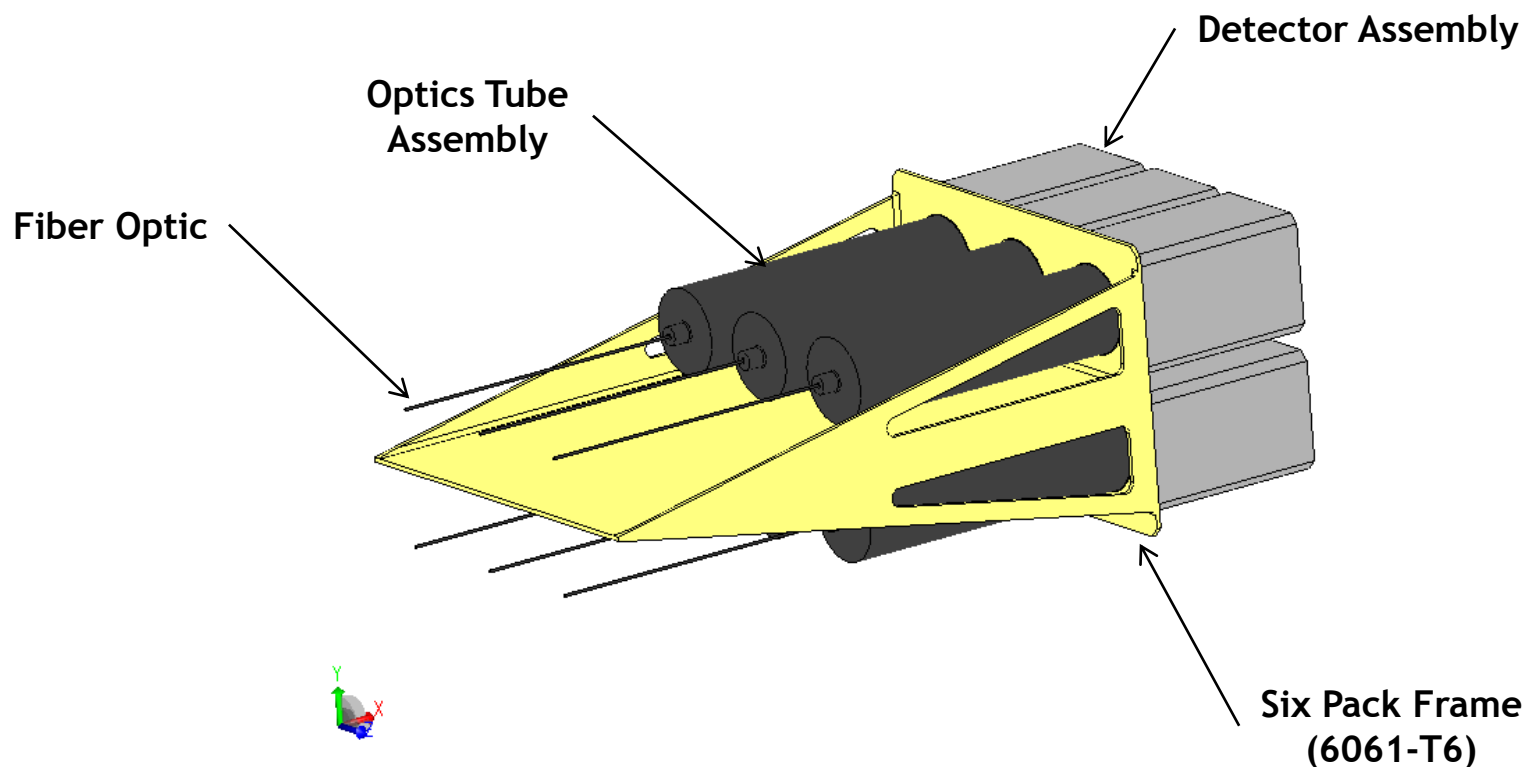
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**Note: InGaAs and Si Boards will be separated by G-10 spacers and Thermal Shields (not shown) to ensure they maintain proper operating temperature.**

# Detector Six Pack

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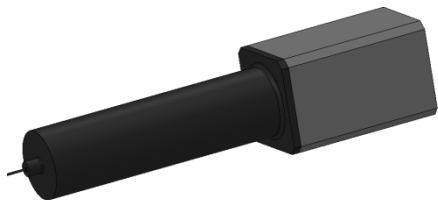
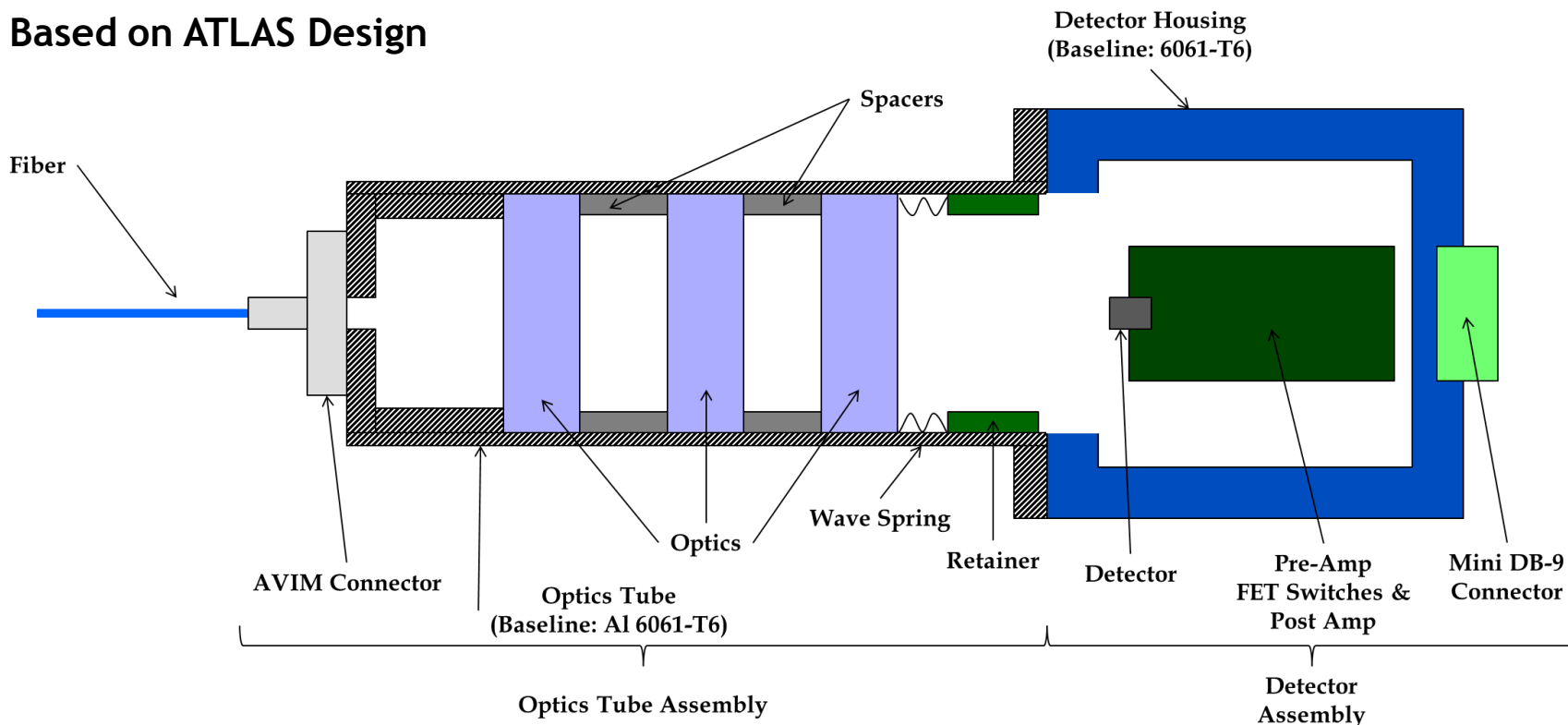


**Note: Lens/Detector Assembly = Optics Tube Assembly + Detector Assembly**

# Lens/Detector Assembly

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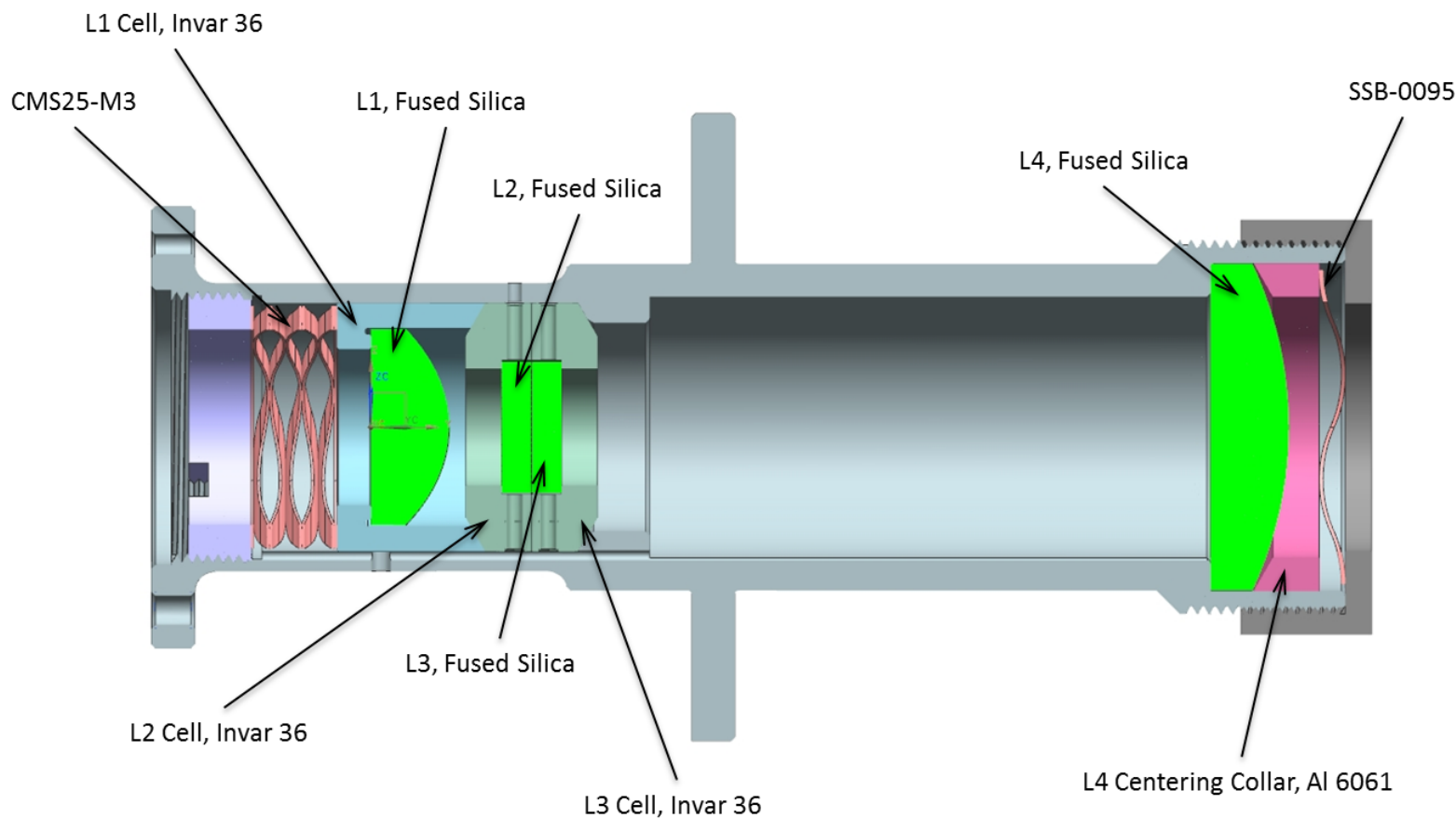
Based on ATLAS Design



**Note:** Material to be used for the Optics Tube and Detector Housing is baselined as Aluminum. Depending on temperature excursions of the assembly and optical alignment tolerances, it might be necessary to use Titanium instead.

# ATLAS Optics Tube

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# Fiber Optic Routing

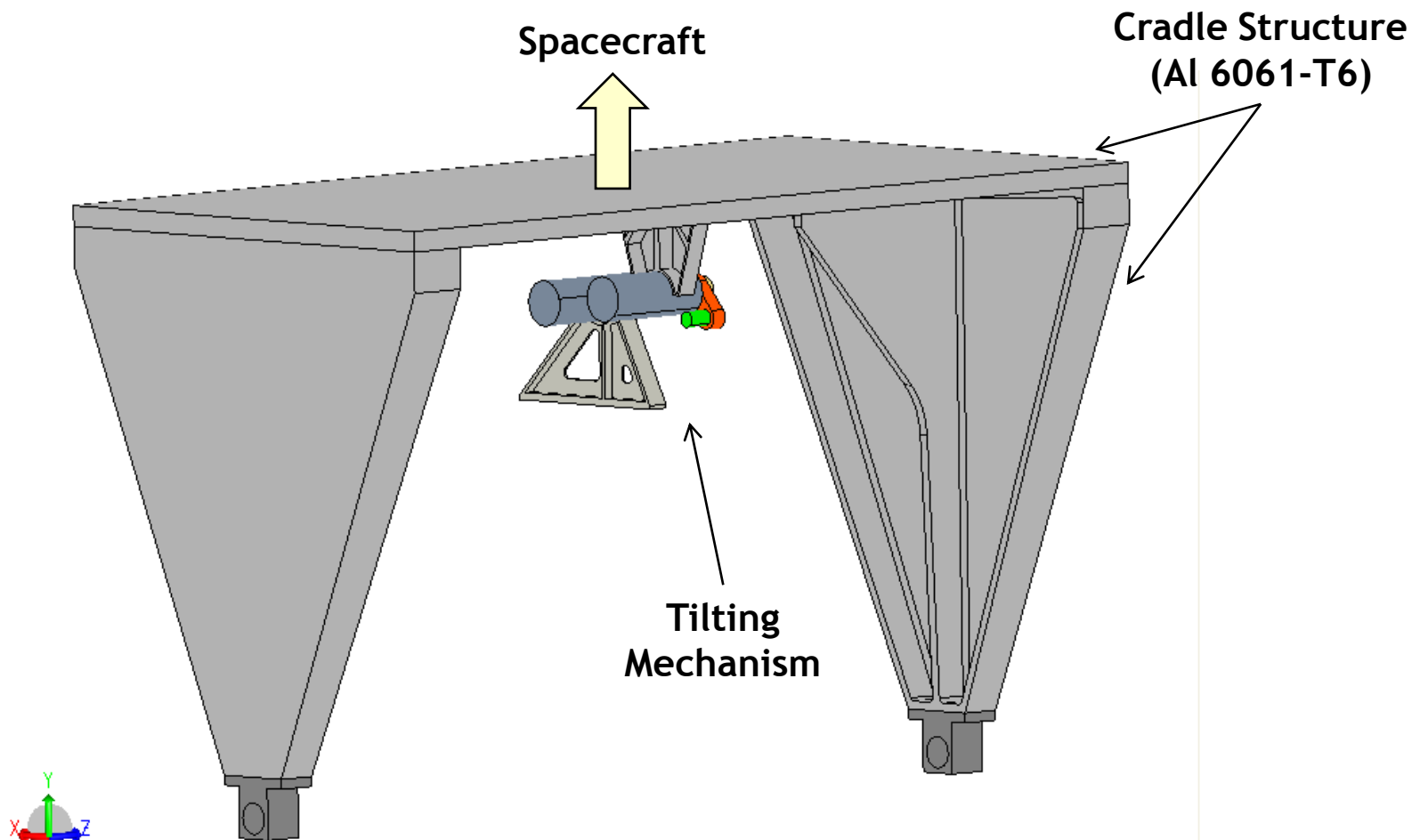
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- Fibers will be routed using Delrin C-Channels on the Aft Structure panels
- Talked with Photonics Group at GSFC
  - Ok to have short runs of unsupported fiber length from detector to nearest C-Channel
- This design eliminates the Fiber Optic Routing Panels from OCE2

# Cradle Assembly

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# Concerns

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- **“Busy” Focal Plane**
- **Routing of Fiber optics**
  - Need more information and time to model the routing and ensure enough precautions are taken to safeguard fiber optics during launch
- **Layout of Aft Optics**
  - Layout currently in several planes which will increase difficulty of alignment
  - Current design can work mechanically (might need to be reinforced to comply with strength and stiffness requirements)
- **Stiffness of various Structural Components**
  - Need to ensure Calibration Mechanism is well attached to Scan Drum
  - Need to confirm the optical bench provides adequate structural stability for the optics
  - Cradle structure needs to be analyzed to ensure it provides adequate structural stiffness
  - 10kg to 15kg of structural mass might be needed for structural reinforcement